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Moisture Problems in Attic and Wall Cavities of a Home

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However, if the plaster is rough and covered with paper, applying paint as a vapor barrier is not practical or effective. In some cases, an effective vapor barrier can be installed by placing a polyethylene sheet over the papered wall and applying wall board or panel on the inside of the outside walls of the home. A more difficult and expensive but effective method of applying a vapor barrier is to remove the plaster and lath, apply insulation with a vapor barrier and then finish the inside of the outside walls with wall board or paneling.

Usually the siding of older homes is not tightly constructed and therefore is in a condition that the wall "breathes." This helps avoid condensation trouble in the stud space because it assists in evaporating and carrying away any condensation that occurs on the insulation.

PAINT PEELING

Peeling paint on the outside of homes is not only unsightly, but it is also costly to scrape, clean and replace. In addition, structural damage may be done to the home from the same cause as the peeling.

The exact cause of paint peeling is sometimes difficult to determine. In some cases it is caused by condensation of moisture on the back surface of the siding. A home properly insulated and with a properly installed vapor seal will seldom have peeling paint from moisture condensation.

If peeling is caused by condensation, the problem may be solved by improving the effectiveness of the vapor barrier or by increasing the ventilation between the studding to evaporate and carry away any excess moisture that is in the wall cavity. Small screened ventilators are available for installation in the siding, usually at the top and bottom of each stud space.

In other situations, the source of the moisture can be found and eliminated. An example is to cover the soil in the crawl space with the polyethylene vapor barrier.

For the more complicated paint peeling problems, you should obtain the services of a reputable person who has the knowledge and experience to solve this problem.

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moisture problems in attic and wall cavities of a home

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Recently, a homeowner got in touch with his local Extension office to solve a moisture problem in the attic of his home. The relative humidity in the attic was above 90 percent, and frost and ice had formed on the bottom of the sheathing. When the temperature rose above 32°F., the frozen material melted and dripped into the attic insulation and soaked through the ceiling board.

This guide was prepared to help you with moisture condensation problems such as these. If you have similar problems, this guide should be helpful in diagnosing and curing them.

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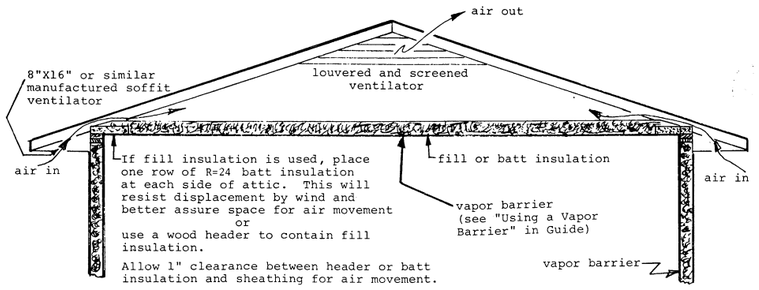

Figure 1. Proper construction to avoid attic moisture problems.

AMOUNT OF ATTIC INSULATION TO USE

Figure 1 shows an attic above a single or multiple-story home. When insulation was first manufactured and used, a 4-inch thick (R=16) layer was usually recommended for the ceiling. Later, as electric heat entered the picture, energy consultants, architects, and building engineers recommended a minimum R=24 ceiling insulation. With today's energy crisis, even more insulation (10-12 inches) is recommended. Insulation makes the home more comfortable and saves heating costs regardless of the type of fuel you use.

VENTILATING THE ATTIC

Proper ventilation of the attic is important to prevent moisture condensation problems there. Where a vapor barrier is used on the lower side of ceiling insulation, there should be a net free ventilation opening area equal to 1/300 of the attic area. For a 1,500 square foot attic, this would be 5 square feet of net free area. All vents should be louvered and screened, so this cuts their efficiency in many instances to about 50 percent. Therefore, for the 1,500 square foot attic, there should be 10 square feet of louvered and screened ventilator openings.

For best circulation, about half of the ventilator space should be at the eave level and half near the ridge. With ventilators at the soffit and also near the ridge, breezes force air through the attic, and there is natural air movement due to convection currents. The 8 x 16 inch or similar size manufactured ventilators are convenient to use at the soffits or eave projection. Use triangular units at the gable ends.

If the house has a four-way slope roof and no gable ends (hip roof) a ridge ventilator may be used instead of the triangular gable units. A properly designed ridge ventilator is effective in ventilating the attic.

If this procedure is carefully followed the attic should be ventilated well enough so that moisture passing through the ceiling in the form of vapor doesn't condense and is carried out of the attic by ventilation.

USING A VAPOR BARRIER

Vapor barriers prevent house moisture from entering ceiling insulation where it is likely to condense and cause moisture problems. A vapor barrier should always be placed over the side of the insulation which is closest to the ceiling.

If you use batt-type insulation, use one with a vapor seal built in. Fill-type insulation that is blown in place should have a polyethylene vapor barrier laid between the ceiling joists first. Be sure to lap it 4 inches up on the side of each joist. Then blow or pour the insulation on top of the polyethylene.

For a one and one-half story house, ventilators must be installed so that the attic is uniformly ventilated. Provide space between the rafters and the sloping portion of the second floor walls so that air movement is adequate. Each installation must be planned carefully to accomplish good attic ventilation.

During winter in the Midwest, even when a vapor barrier is used at the bottom side of the attic insulation, a small amount of moisture vapor passes from the warm living area of the house through the ceiling into the cold attic. With no ceiling vapor barrier, much more water vapor passes through the insulation into the attic. Attic ventilation is needed to remove this moisture to keep it from condensing on cold surfaces in the attic, especially on the bottom of sheathing boards.

In the problem outlined at the beginning of this guide, the attic was insulated with R=24 insulation with a vapor barrier. However, the builder erroneously decided on no attic ventilation. Consequently, moisture passing from the warm living area through the ceiling into the cold attic was trapped. The relative humidity was above 90 percent, and moisture condensed on the bottom of sheathing boards, the tops of joists, and on other exposed lumber surfaces.

Louvers and vents were installed in accordance with the information and recommendations set out in this guide. This completely eliminated the problem.

Some blown-in or fill-type insulation is lightweight, and high winds may displace it around soffit ventilators. To prevent this, use R=24 batt-type insulation 24 inches wide around the edges of the attic (see Figure 1). This is more resistant to movement by the wind. If it is more convenient, use wood headers between rafters and ceiling joists at the outer edges of the ceiling joists to contain the fill insulation. In either case maintain a minimum of 1 inch of space below the sheathing boards for free air movement.

COLOR OF ROOF TO USE

Some builders like to use black shingles on the roof. Dark shingles conduct much more heat through the roof than white ones. If R=24 or more insulation is used and the attic is well ventilated as described here, this extra heat will have little effect on the lower surface temperature of the ceiling. So use any color shingles you like if the attic is properly ventilated and the ceiling is properly insulated.

MOISTURE IN THE WALL CAVITY

Condensation problems in wall cavities develop when moisture from the warm moist air moves into the wall cavity in the form of vapor. It condenses on the insulation near the outside surface or on any other cold surface.

In nearly all newly constructed homes, moisture in wall cavities is avoided by installing a vapor barrier on the warm side (inside) of the wall insulation. This vapor seal is built into most batt-type insulation.

A newer batt insulation is one without a vapor seal or any covering at all. It is cut in blocks, fits snugly between the studding, and completely fills the cavity between the studding. The vapor barrier is provided by stapling a clear polyethylene sheet on the inside of the studding after the insulation has been installed. Installation of electrical wiring, plumbing, heat ducts, etc., should be completed before the vapor barrier is installed so that the wall board or paneling can be immediately applied to protect the vapor barrier against damage.

When you're remodeling an older house, and insulation is blown into the wall cavities, applying a vapor barrier on the warm side of the insulation may be difficult. If the inside of the wall finish is smooth plaster or wall board, a good vapor barrier can be provided by two coats of aluminum paint and spar varnish (½ and ½) covered with two coats of decorative paint.